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Vol. XI. JUNE, 1905. No. 9.

THE AGRICULTURAL STUDENT

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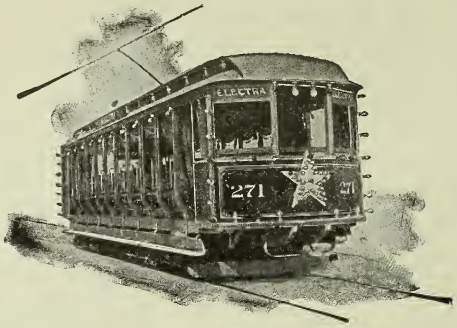

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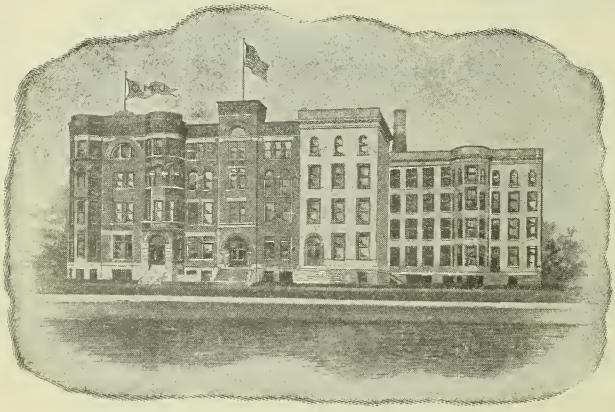

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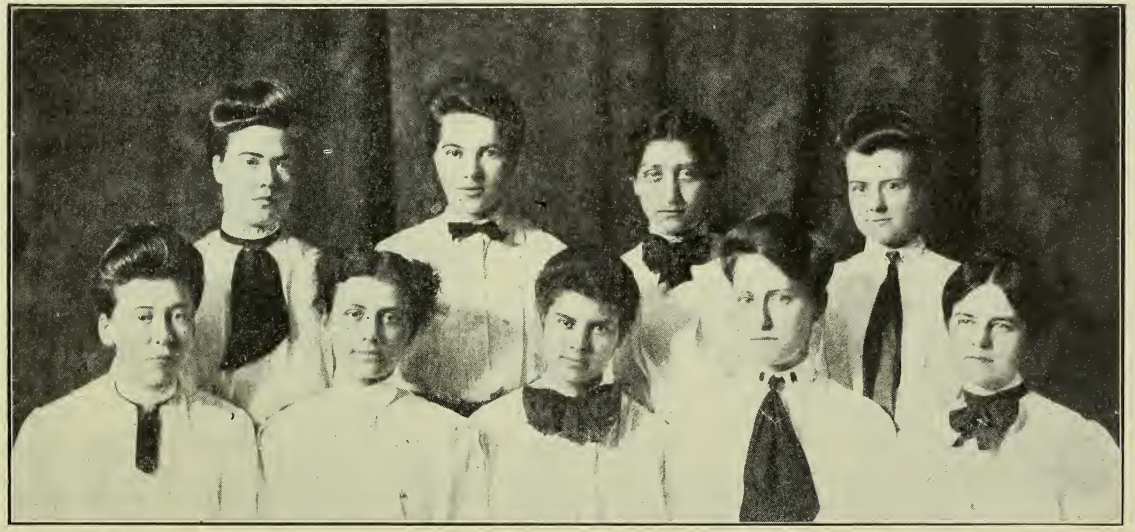
CLASS IN DOMESTIC SCIENCE, 1905



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Top row, from left to right—Nola K. Fromme, Vivian Watt, Frieda Hirsch, Opal I. Tillman.
Bottom row—Nola R. Knox, Alice Spitler, Loula Thompson, Clara N. Campbell, Emma E. McKinley.

THE AGRICULTURAL STUDENT.

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EDITORIAL CHAT.

With this issue the eleventh volume of the AGRICULTURAL STUDENT is completed. We believe that the efforts of the present staff have been attended with some degree of success, and feel well repaid for the time and labor devoted to the interests of the STUDENT. We have endeavored to maintain the general tone of the publication, at the same time making it a means by which the students can begin a connection with the agricultural press, which, if continued through life, will be a benefit, both to themselves and their friends. The State expects those who have had the advantages of a college education to pass it on to those less fortunate, and in no way can we come in contact with so large a number as through the press.

By far the larger number of articles published during the year have been written by the students of the College of Agriculture. The articles have evidently been highly appreciated by our readers, and the STUDENT takes this means of thanking its contributors. We wish to especially thank Professor Graham for the series of articles, which he has furnished throughout the year, for we feel that their influence has been far

reaching in attracting the attention of the people toward the agricultural extension movement. That the STUDENT is also attracting attention outside of the State is evident in the large number of exchanges received, and in that files of the magazine are being placed on the shelves of prominent libraries.

We take this opportunity to thank the various members of the staff for their efficient work throughout the year. All have cheerfully performed every task assigned them and the success of the magazine during the last year has been largely due to their faithful work. Trusting that our successors may have the same hearty coöperation and support, and that the STUDENT may experience the same success in the future as in the past, we say farewell.

We regret that we have been unable to publish individual sketches of the members of the senior class, as has been customary previously, but the large number in the out-going class, and limited space, makes this impossible. However, as we think it will interest many we will give a short class sketch, the pictures and names of the seniors, together with their theses subjects.

OUR SENIORS.

The Senior class of the College of Agriculture and Domestic Science for 1905 is the largest in the history of the institution, numbering in all thirty-two; twelve in Agriculture; eight in Horticulture and Forestry; and eleven in Domestic Science. A comparison of the enrollment of the College of Agriculture to the enrollment in the entire University shows that in having 31 graduates in a class of about 210, the College of Agriculture is furnishing its full quota and a little better. Nevertheless, when we think of Ohio's vast rural population, this year's class is but a small portion of the number that should annually go out from the doors of her only agricultural college.

Quite varied are the pursuits that these few expect to follow for their life work. Some, and in fact by far the greater part, will return direct to the farm to take up as owners or managers, stock farming, general farming, fruit and market farming and dairying. Others will take up other phases of agriculture, as instructors in agricultural schools and colleges, employes in the department of the United State's Government, and various positions with the agricultural press. Some few will carry their lines of investigation farther, turning again to Ohio State, or to some other agricultural college, to receive their Master's degree.

Many fields for doing good work lie open to these young people. All of them, if they fully appreciate their opportunities can do much to better their communities in many ways. It has often been said that the agricultural college "educates the young people away from the farm rather than to it." Strong arguments can be offered, both "pro and con," but I hardly believe that any one who has any aptitude whatever for the farm, and who realizes the opportunities there will ever be educated away from it.

It is of considerable interest to know how many of those entering the school in the fall of 1904, for the four years' course in agriculture, have remained for the entire length of time. This is difficult to ascertain, for quite a few have at times dropped out of the class and oth-

ers of previous years have returned, thus increasing or decreasing the number as the case may be. The numbers as shown in the office of the department are as follows:

	1901-02	1902-03	1903-04	1904-05
Agriculture	27	15	10	12
Horticulture	4	3	1	8
Domestic Science	17	6	8	11
Totals	48	24	19	31

SENIORS AND THESES IN AGRICULTURE.

Elkana Elhana Finney, Cedarville, Ohio—Thesis: The Variation of Ash and Sugar in Milk.

Chester Glenn Foster, London, Ohio—Thesis: Disposal of Sewage on the Farm.

Henry Hoge Hamilton, Brownsville, Ohio—Thesis: Some Determinations Concerning the Distribution of the Pull of the Horse.

James Vernon Hyatt, Augusta, Ohio—Thesis: Some Phases of Horse Nutrition.

William A. Martin, Kenton, Ohio—Thesis: A Study of the Ohio Short-Horn.

Edward Russel Minns, Lodi, Ohio—Thesis: A Study of Root-Tubercle Bacteria of Leguminous Crops.

William Henry Palmer, Thurston, Ohio; James Chalmer White, Lebanon, Ohio—Joint Thesis: A Study of Farm Practices in Ohio.

Emerson Scott Poston, Logan, Ohio—Thesis: The Effect of Land Tenure on the Social and Economic Conditions of Agriculture in the Hocking Valley.

Dwight Wilson Weist, Basil, Ohio—Thesis: Sheep Husbandry in Ohio.

Frederick Long West, Bloomingburg, Ohio—Thesis: A Study of the Cattle Market.

Thomas Leroy Wheeler, Columbus, Ohio—Thesis: The Effect of Land Tenure on the Social and Economic Conditions of Agriculture in Southwestern Ohio.

Edgar Levi Zehring, Germantown, Ohio—Thesis: A Study of the Bot-Fly.

SENIORS AND THESES IN HORTICULTURE AND FORESTRY.

Edward D. Coberly, Georgesville, Ohio—Thesis: Relation of Rainfall and Temperature to Crop Production.

Ira Judson Condit, Jersey, Ohio—Thesis: Insect Pests of the Greenhouse; A Study of Existing Conditions in Columbus Greenhouses.

Edwin Charles Cotton, Elyria, Ohio—Thesis: A Study of Insects Affecting the Black Locust.

Charles Henry Flory, Arcanum, Ohio; Reedo Lorenzo Fromme, Richmond, Indiana—Joint Thesis: The Influence of Environment Upon the Timber Trees of Ohio.

Charles Austin Miner, Bristolville, Ohio—Thesis: Nature's Method of Distributing Trees.

Lindley M. Smith, Chesterhill, Ohio—Thesis: Insects Injurious to Stone Fruits.

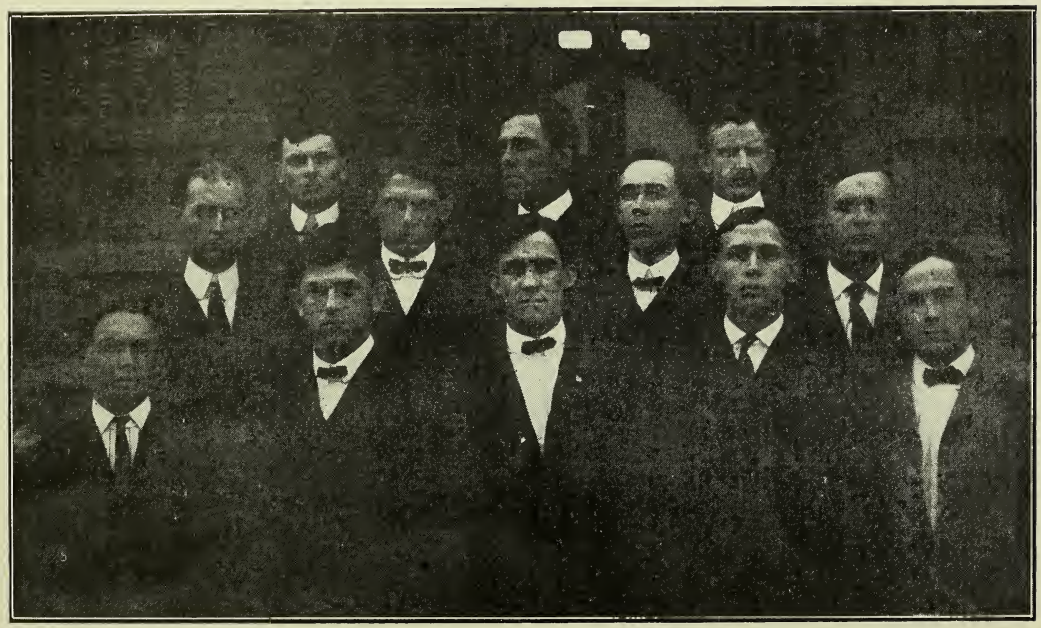
SENIORS AND THESES IN DOMESTIC SCIENCE.

Clara Naomi Campbell, Columbus, Ohio; Emma Evans McKinley, Columbus, Ohio—Joint Thesis: A Study of Silk: Culture, Manufacture and Properties.

Sophia Weber Fox, Columbus, Ohio—Thesis: A Study of Carbo-hydrates and Their Relation to Food Economics.

Nola Katherine Fromme, Richmond, Indiana—Thesis: Plans, Specifications and Equipments for Domestic Science and Domestic Art Laboratories for the High Schools of Ohio.

CLASS IN AGRICULTURE, 1905



Top row, from left to right—Henry H. Hamilton, James V. Hyatt, John T. Dallas.

Middle row—James C. White, William A. Martin. Edward R. Minns, Emerson S. Poston.

Bottom row—Fred L. West, Elkana E. Finney, Dwight W. Weist, Chester G. Foster, William H. Palmer.

Frieda Hirsch, Columbus, Ohio—Thesis: Investigations in the Home-life of the Working Classes.

Nola Rowena Knox, Westerville, Ohio—Thesis: The Economic Function of Women.

Alice Spitler, Dayton, Ohio; Vivian Watt, Freeport, Ohio—Joint Thesis: Interior Decoration of the American Home; A Criticism.

Loula Thompson, Georgetown, Ohio—Thesis: Some Experiments of the Digestibility of Cheese.

Opal Ione Tillman, Greenville, Ohio—Thesis: The Life History of the Cucumber Plant, with Notes on the Domestic Value of the Cucurbitaceae.

M. Sc. in DOMESTIC SCIENCE.

Mary Faye Hill, B. Sc. (in Domestic Science), Columbus, Ohio—Thesis: A Comparative Study of Food Consumption.

THE SHEEP INDUSTRY IN OHIO.

I. G. McBETH.

The sheep industry of Ohio has from her earliest history been a very important one. The pioneer settlers brought with them flocks of the common or so-called "native" sheep found generally through the eastern states before the introduction of the Spanish Merino. These sheep were small, leggy and coarse wooled; but hardy and prolific and for attention given were perhaps better suited to the needs of the people than any other breed of sheep. They were kept for their wool, which was worked up around the family hearth into the strong durable raiment of the early settler.

The Spanish Merino first appeared in Ohio in 1807. At which time Seth Adams moved from Massachusetts to Muskingum county, Ohio, bringing with him 25 or 30 sheep, the descendants of the Spanish Merinos which he imported in 1801. In 1809 and 1810, Mr. Adams, acting as agent for Colonel Humphreys, disposed of many of the latter's sheep throughout Ohio. Most of these, however, were half-bloods and as far as we are informed, they laid the foundation of no important flocks.

In the same year in which Mr. Adams introduced the Spanish Merino into Ohio, Mr. William R. Dickinson removed from Virginia and settled at Steubenville, Ohio. At which place, to use his own words, he commenced "zealously rearing and improving." His ambition was to produce an animal of a remarkably fine fleece combining to a good degree, weight and length of fiber.

About 1814 or 1815 Mr. Wells, who was associated with Mr. Dickinson in the manufacture of woolens, purchased several hundred pure Spanish Merinos and placed them on his farm near Steubenville. In 1824 his flock is said to have numbered 3,500 sheep. Mr. Wells and Mr. Dickinson continued to breed and improve Spanish Merinos until 1829, when through business reverses they were forced to dispose of their flocks. Some of the choicest sheep going to Washington County, Pennsylvania, but most of them going to enrich the flocks of Ohio, and many of the finest flocks of today trace their origin to the Wells and Dickinson sheep.

The tariff acts of 1824 and 1828 were great incentives to wool growing. These measures passed at a time when immigration to the State was very large decided the occupation of many [illegible] settlers.

From 1835 to 1845 the Saxon Merinos overran the State, and for a time

became the predominant sheep. The introduction of the Saxon improved the fineness of the fiber, but greatly reduced the weight of fleece, and as soon as the woolgrower realized that he was losing more in quantity than he was gaining in quality the Saxon was discarded and there was a great rush to cross with the large, heavy fleeced French Merino. The French Merino cross became common all over the State as soon as full-blooded rams could be secured. This cross gave a medium grade of wool with heavy fleece, that lost less in scouring. It was found, however, that the fleece of the Spanish Merino was superior to the French and the latter was soon abandoned. For a time the Silesians met with some encouragement, but they, too, gave way to the superiority of the Spanish Merino.

The political and commercial revulsion of Europe in 1847 and 1848 caused such a depression in the wool market as to make wool growing unprofitable. This, together with the growing demand for mutton, caused many in the vicinity of cities to cross their Merinos with Southdowns or Leicesters. The mutton sheep were rapidly growing in favor when the Civil War gave a new impetus to wool growing. At no time in the previous history of the State had the demand for wool been so great. Every farmer increased the number of his sheep. Wool sold for $1 per pound and there was scarcely a county in Ohio that could not boast of the possession of a $1,000 Merino ram. After the close of the war the price of of wool again fell below the profitable mark and thousands of Merinos were sent to the slaughter. So great was the depression that Merinos sold as low as 60 cents, and the number of sheep was reduced more than two and one-half millions in two years.

Previous to 1863 the longest combing wool had been used in the manufacture of carpets. The war created a demand for coarse army woolens. This demand, together with the introduction of machinery for its manufacture into cloth and its scarcity in the American market caused the price to rule high. Many woolgrowers discarded the Merino and adopted the long wools or the middle wools as the most profitable sheep. In 1865, 90 per cent. of the sheep of the State were Merinos, or their grades in 1887 Merinos numbered but 52½ per cent. of the whole.

In the new era that had dawned in the sheep husbandry of the State the Cotswold came in for a good share of the change. The Southdown was the favorite mutton sheep and they have maintained their ground well in the neighborhood of cities where first-class mutton is in demand. In 1885 Shropshires numbered one-fourth of all the sheep of the State, and they have made much headway since. Oxfords are not so numerous as the Shropshires or Southdowns, but they have staunch friends in many parts of the State and are often preferred for crossing upon common or grade Merino ewes.

The last half century has seen the development of a breed of sheep known as the Delaine. Their development is due to the efforts of the breeders of Ohio and Pennsylvania. Experience had taught them that legislation was more often in the interests of the manufacturer than the grower, and they determined to produce a sheep that would be self protective. In a large measure they have succeeded. The carcass has been enlarged and the mutton form improved with little deteioration in quantity or quality of wool.

In comparison with other states Ohio ranks first in the total number and value

of sheep produced during the last half century. It is true she has not always stood in the front rank. Other states have surpassed her both in number and value of sheep for short periods of time. First California, then Texas, now Montana and Wyoming, California and Texas have ceased to be serious competitors. The industry of Montana and Wyoming seems to have reached its highest development. There are no longer cheap but valuable grazing lands to be had for the taking. The shepherd of Montana and Wyoming must always be at a disadvantage in feeding and marketing his product. Ohio presents as inviting a field for sheep husbandry as any other State in the Union. In no other State, with the possible exception of Vermont, can wool of so fine a quality be produced as in Ohio. The breeders of Ohio are among the most intelligent in the land. It is not our purpose to prophecy, but in view of the above-mentioned facts it seems reasonable to predict that Ohio will in the course of a few years, at most, take her accustomed place and lead all other states in the production of wool and mutton.

AMERICA'S LIVE STOCK INDUSTRY.

FRED L. WEST.

There are in the United States 67,800,000 head of cattle, 62,876,000 hogs and 61,605,000 sheep. The above figures are for all ages, and are from the live stock census taken by the government in 1900. The previous census of live stock were improperly taken, often not giving the suckling pigs, the calves and the lambs. Such irregularities and omissions caused the wide difference between the live stock census as given in 1890 and previous years and that taken in 1900. For this enormous herd of 192,000,000 edible live stock the United States has a population by the same census of 76,000,000 people. That gives the country more than two and one-half animals for every man, woman and child of its population.

That means, roughly, 500 pounds of fresh beef, 100 pounds of fresh pork and 34 pounds of fresh mutton—634 pounds of fresh meat—per head of population.

According to a private estimate, the abattoirs and farmers of the United States kill annually about 10,000,000 cattle and calves, 40,000,000 hogs and 40,000,000 sheep. This means about 7,000,000,000 pounds of flesh or carcass beef, 5,600,000,000 pounds of pork and 2,000,000,000 pounds of mutton or an annual total of 14,600,000,000 pounds of fresh meat. To the above must be added about 400,000,000 pounds of by-products from the slaughtered animals, making in all 15,000,000,000 pounds of meat to a population of 76,000,000 people, or about 200 pounds per capita.

On this basis China would have to kill 100,000,000,000 pounds of meat for her 500,000,000 of population. On this basis of American live stock China would have to possess 440,000,000 head of cattle, 415,000,000 hogs and 403,000,000 sheep and lambs, or 1,258,000,000 head of edible live stock to have a meat diet equal to that of the Americans. But the best estimate of the world's total herds and flocks show that there are only 310,000,000 head of cattle, 600,000,000 head of sheep, 100,000,000 head of goats, or a total of 1,080,000,000 edible live stock in the whole world, with which to feed its estimated population of 1,500,000,000 people, of which 800,000,000 are semi-civilized

CLASS IN HORTICULTURE AND FORESTRY, 1905

Top row, from left to right—Ira J. Condit, Charles A. Miner, Edwin C. Cotton.

Bottom row—Charles H. Flory, Edward D. Coberly, Prof. William R. Lazenby, Lindley M. Smith.

grain-eating Asiatics and 450,000,000 North Americans and Europeans.

It was this call for the surplus meats of the world which created the international exchange of and trade in animal food products. On the deficiency of the European available supply and the increased general hunger of Europe the American meat trade has been built and has grown, because the United States has a larger percentage of hogs, sheep and cattle combined, per capita of the population, than that of any other country. The exceptions as to sheep and cattle are Australia (including New Zealand). with 110,000,000 sheep and 11,000,000 cattle to 5,000,000 people, and South America, with 100,000,000 sheep and 23,000,000 cattle to a population of about 33,000,000 people. Those countries have very few hogs. They, with North America, furnish the live stock, fresh meat and provisions now exported to Europe to make up the deficiency there for feeding the inhabitants of Great Britain and the continent.

The above countries—North America, South America and Australia—with a combined population of 114,000,000 people, have 273,000,000 sheep, 102,000,000 cattle and 66,000,000 head of hogs, or 441,000,000 head of the world's edible live stock of the above classes named, the United States alone possessing 63,000,000 of the hogs. These countries, therefore, have more than 2¼ sheep, nearly 1 bovine and about 3-5 of a hog for each head of their joint population.

From this standpoint take a peep at Europe. Great Britain has only 7,000,000 head of cattle, 27,000,000 head of sheep and less than 3,000,000 head of hogs with which to feed 36,000,000 people. To these must be added the animal industry and the population of Ireland.

The continental nations are apparently in a better position than the Briton, but still in a weak position for feeding their peoples from purely domestic supplies. Their folks buy less of meat per capita.

THE LIVE STOCK SUPPLY.

The flocks and herds of the United States have really been at a standstill during the last twenty years, while the population has been increasing at an astonishing rate, widening the ratio between the two. Great Britain's flocks and herds have, if anything, gone back, while the population has gone ahead. the flocks and herds of Ireland have virtually been stationary for a quarter of a century.

Twenty-five years ago France had 188 head of live stock per 1,000 acres of her area. She now has 164 head or a dead loss of 24 head per 1,000 acres of the country. Denmark had 197 head per 1,000 acres then, and 115 head now, or a loss of 82 head per 1,000 acres. Germany, a quarter of a century ago, had three times as many sheep per head of population as now. The fatherland now has fewer cattle per capita of the people than then. Holland and Switzerland have only half as many sheep per head of population now as they had two and a half decades ago, and Belgium only a fourth as many. In these countries during that time the flocks of sheep alone have actually decreased from 104,000,000 to 75,000,000, showing an actual loss of 28 per cent. At the same time the increase in the population was 25 per cent., thus making the comparative loss much greater. The combined population of Germany, France, Austria-Hungary, Switzerland, Sweden, Denmark, Belgium and Holland twenty-five years ago was 140,000,000. This human family has now increased to 173,000,000 people or 24 per cent. Meantime the

combined herds of cattle of these countries have only increased from 48,000,000 to 58,000,000 head or about 20 per cent. The above figures show that there are only 58,000,000 head of cattle to feed 173,000,000 people, whereas there are 67,000,000 head in the United States to a population of 76,000,000; nearly 100,000,000 people less than there are in the above continental countries. The flocks of those same nations are in a worse relative position and their hogs, comparatively, are a small commercial item.

In 1874 the United Kingdom imported from all sources 500,000,000 pounds of meats. In 1899, twenty-five years later, she imported 1,700,000,000 pounds. As the population has not increased over 25 per cent. and the edible herds have remained stationary, the excess is due to increased per capita eating.

CONDITION IN EUROPE.

The relative scarcity of meat upon the continent is readily seen by the excessively high prices paid there for all carcass meats. These prices average 100 per cent. higher wholesale than similar meats sell for in the United States, and 30 to 50 per cent. higher than they do in England, even in the face of the fact that labor and other continental items of production are cheaper than either in Great Britain or the United States.

The growing scarcity of the world's edible meats is produced by the two causes previously named; the faster increase of the human race in proportion to the increase of abattoir animals, and the improved condition of the working classes, which causes a greater per capita consumption of meats than existed two decades ago. The per capita consumption of meats in the United States has increased fully 25 per cent. during the last fifteen years. In Great Britain it has nearly doubled in the same time. On the continent the demand as measured by the very high local prices of meats, has largely increased, but the increased consumption has been limited by the virtual exclusion of foreign meats and the insufficiency of the domestic herds to supply the local demands. With improved industrial conditions and continuing high meat tariffs or other means for excluding the surplus of other countries the masses of the continental nations must desist from meat eating or pay exorbitant prices for this essential staff of life.

TASTE OF THE PALATE.

The taste of the human palate leans to beef and pork. That is the popular meat diet of the world. It is a remarkable fact—verifies the above—that the hog and cattle herds of the earth have practically stood still for over twenty years and the sheep flocks have rapidly and enormously increased in the new countries. Glance at the three chief of these sheep-growing countries—Argentina, the United States and Australia. They show this: In 1830 Argentina had 2,500,000 sheep, 41,000,000 in 1870 and 90,000,000 in 1900. The United States had, in 1830, a few millions of sheep, 42,000,000 by a liberal count in 1880 and 62,000,000 in 1900. Australia's flocks increased from a few thousands in 1830 to about 90,000,000 in 1880 and 110,000,000 in 1900, despite the loss by drought of 30,000,000 sheep in New South Wales alone during the last ten years. The flocks of Europe have largely decreased. The continued increase in population along with the failure of edible live stock to multiply in proportion, will inevitably make the meat diet a generally high-priced one so long as the improved condition of the masses enables people to buy and to eat

more meat than formerly. The elimination of consumers by a more widely spread condition of poverty among the populace is the only hope for low meat prices. Such general pauperism would lead further to vegetarianism and to deplorable economic conditions everywhere.

The world is growing richer under the operation of the great forces of steam, electricity and machinery, brought to bear on the natural resources of the earth, and as the purchasing power of the masses increases there will naturally come a permanent high range in values, especially in meat, although this will fluctuate with crops and seasons.

The supply of hogs and sheep can be increased more rapidly than that of cattle, and high prices for beef will naturally stimulate the production and consumption of pork and mutton and exercise a regulative influence on the price of beef.

OAT SMUT.

EDGAR C. RICHEY.

It is probable that there is no other class of plant diseases which cause as much damage to the oat crop of the country as the smuts. The smut of oats is more widely distributed than almost any of the other plant parasites. It is known on every continent, and occurs all over the United States. Fields entirely free from it are rare; and the aggregate amount of damage which it does is very great. Few farmers who grow oats every year have any adequate conception of the extent of the ravages of this pest. Professor Kellerman and Mr. Swingle have estimated that the actual loss in Kansas from oat smut from 1888 to 1890 was at least $2,144,181; the percentage of smutted heads varying from 6.5 to 15 per cent. A conservative estimate of the direct loss caused by smut would be 8 per cent. of the crop, and at this estimate the loss in the United States alone would be over $18,000,000 annually.

Not many farmers who grow oats would think that the black dust that replaces the entire head of the oat plant, was a definitely organized plant; but as a matter of fact this black dust is composed of many minute spores of a parasitic plant known to botanists as Erstilago avenæ. These spores, which have the same function as the seeds of higher plants, are very small and light and are easily blown about by the wind, thus providing for the distribution of the parasite. The spores lodge on the healthy kernels where they remain until the seed germinates, when they also become active and send down their hyphal threads into the young plant. The hyphæ first enter the leaf sheath and pass from that into the first green leaf then into the second and so on, thus keeping even with the growth of the plant until the haulm or head is reached. The presence of the parisite cannot be detected until the head is found and the smut begins to replace the kernels. Even then it is sometimes difficult, as one variety of the smut is entirely within the kernels. This form is known as hidden smut and the other form, which attacks the outer chaff as well as the kernel, is called the loose smut.

Several remedies, which are found to be equally effective on both loose and hidden smuts, have been tried for checking and eradicating this pest. Most of the remedies now in use give very good results and are worthy of trial by the farmer.

One of the early treatments and one which gives satisfactory results is the formalin treatment. This consists in soaking the seed oats for two hours in a solution of 1 pound of formalin in 50-60 gallons of water. The commercial formaldehyde which is about 40 percent pure should be used as a stronger solution than this would be poisonous.

Potassium sulphide is also extensively used in combatting smut. In this treatment 1 1-2 pounds of liver of sulphur is dissolved in 25 gallons of water. The seed is soaked in this solution for 24 hours, with frequent agitations. The seed may be soaked for two hours in a solution of 8 pounds of liver of sulphur in 50 gallons of water. This method is almost, if not entirely as effective as the other; but is more expensive and when time will permit the former is to be recommended.

The cheapest remedy and one which gives the best results from all standpoints is known as the hot water treatment. If facilities can be secured for keeping the water at a constant temperature, the seed can be treated quickly and effectively. If the temperature has to be maintained by the addition of hot and cold water at times, it is best to have a helper to attend to the water.

In carrying out this treatment two vessels are necessary, both containing water, one at 110° to 120° F., and the other at 132° to 133° F. The first vessel is for the purpose of warming the seed so that the temperature of the other vessel will remain more uniform. The seed should be placed in a net or open basket and plunged into the tank containing the water at 110° F., until the seeds are thoroughly wet and at almost the same temperature as the water. It should then be placed in the other vessel, care being taken to maintain the temperature at all times. The seed should remain in the hot water for about ten minutes, after which it is ready to dry. In drying it is best to spread the seed on a clean floor or on canvas where it should be agitated at least twice a day.

The important points to be remembered in the hot water treatment are as follows: Maintain an even temperature of 132°, in no case allowing it to rise above 135° or fall below 130°. The volume of water should be six or eight times that of the seed treated at any one time. Never completely fill the basket or net used for treating the seed. Leave the seed in the hot water for ten minutes.

One of the most remarkable and unexpected results of the hot water and potassium sulphide treatment is an increase in the yield beyond the amount that would result from merely replacing every smutted grain with a sound one. Professor Kellerman and Mr. Swingle have estimated that the treatment of seed gave an increase of from one to six times the amount to be expected by replacing the smutted grains. These results were afterward confirmed by other experimenters working along the same lines; so that it is an assured fact that it will pay to treat where the percentage of smutted grains is only one or two percent.

The cause of this increase is not definitely known, but there are a number of theories. One of these is that the germinative power of the seed is increased so that quicker growth and better stands are secured. If this explanation is correct it is probably due to the fact that part of the starch in the seed is converted into diastase by the heat, thus giving the young plant a larger store of available food. Another very reasonable theory holds that there are a large number of plants or heads, which

cannot be classed as smutted, but which are stunted in growth so that they will not produce a full crop.

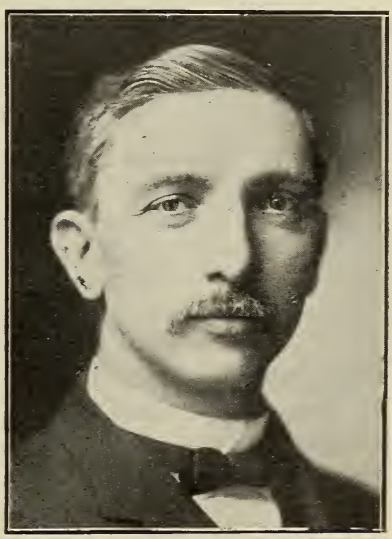
Other explanations might be given for this increase in yield, but it is enough for us to know that the increase does exist and that by a little care the farmer may increase his yields from eight to twenty per cent per acre.

Superintendent A. B. Graham.

At a recent meeting of the Board of Trustees of the Ohio State University, Mr. A. B. Graham of Springfield was appointed Superintendent of Agricultural Extension in the College of Agriculture. This appointment is the beginning of a new phase in agricultural education in Ohio, further indicating the genuine interest that is being taken by the University in the boys and girls on Ohio farms.

Mr. Graham is especially fitted for this work. He was born on a farm in Miami County, Ohio, and attended a district school until eleven years of age when his father died and his mother moved into the village of Lena in order that her children might have better school privileges. At the age of seventeen, he began his career as a teacher in the district school which he had attended when a small boy. He spent one year in the Lebanon Normal School and the winter of 1899-1890 in the Ohio State University. After spending nearly two years teaching in the high school from which he had graduated, he returned to teaching in the country schools, as he says: "In order to study conditions effecting rural life and to acquaint myself with the weaknesses and needs of the country school. During those years, I became thoroughly convinced that a reasonable amount of nature study, drawing, literature, and music could be made a part of an elementary course for the rural school having but one or two rooms. I came to believe also that conditions in most rural communities are more conducive to the making of a stronger man or woman in every way than those of the city."

In 1896, he became township superintendent of Mad River Township, Champaign County, and was instrumental in consolidating the schools of the township and introducing nature study and mental work in the courses of study. In 1900, he became superintendent of the Springfield township, Clarke Coun-



SUPERINTENDENT A. B. GRAHAM.

ty, schools and began at once to build up a system of schools that would more nearly meet the needs of a rural population and that would be in harmony with rural life.

In February, 1902, he organized an agricultural club among his pupils for the purpose of studying elementary agriculture. The following year, he secured the coöperation of the Agricultural Students Union of Ohio which furnished him material and a working plan for his club to carry on simple experiments in the growing of corn, vege-

tables, and flowers. The work was so successful that other agricultural clubs were organized among pupils of country schools under the direction of the College of Agriculture of the Ohio State University and materials were furnished them for carrying out the experiments outlined through the Agricultural Students Union from appropriations made to it by the University. Last year, nearly two thousand children of the rural schools were enrolled in this work and an equal number his year. There is a decided awakening in the schools of the state in the preparation of the pupils for country life.

Superintendent Graham's first work will be the rural schools of the state and in assisting the teachers of rural schools in making use of the many opportunities offered for improving country life. Later, other lines of agricultural extension work will be taken up but the rural schools will receive the first attention.

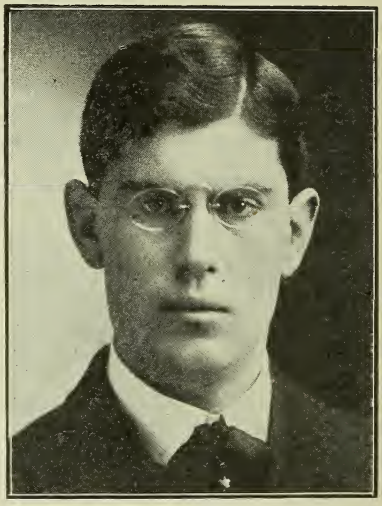
Superintendent Graham assumes his duties July 1, and after that date he will be available for a limited number of teachers' institutes, farmers' institutes, and other organizations especially interested in the rural schools of the state.

Professor Vivian.

Professor C. D. Smith of the Michigan Experiment Station recently visited O. S. U. in an effort to secure Professor Vivian to fill the position of Chemist at the Michigan Experiment Station. Professor Vivian, who is known to all our readers, as the Advisory Editor of THE STUDENT, has not as yet accepted the offer, but is waiting to see what the authorities of O. S. U. may be able to offer him. Professor Vivian is now Associate Professor of Agricultural Chemistry. He has proven himself a great worker and a most successful instructor. Throughout the student body he is exceedingly popular and much regret would be felt at his loss.

Dr. Carl W. Gay.

Dr. Carl W. Gray has been appointed assistant in Animal Husbandry to succeed Mr. H. S. Arkell, who resigned to accept a similar position at Ontario Agricultural College. Dr. Gay is a native of the State of New York, his home being at Ithaca. His early education was received in the common schools of that state, graduating from Ithaca High School. He received his degree from the Cornell Veterinary College in 1900, and was appointed to the fellowship in Veterinary Medicine in that institution



DR. CARL W. GAY.

in 1900. He was engaged in private practice at Syracuse in 1901, giving up his practice to accept the position of instructor in Veterinary Medicine, in the Veterinary Department of Iowa Agricultural College. He spent three years here in the Veterinary Department, and one in the Department of Animal Husbandry, completing his work there early in 1905, and will receive his degree in June. In the short time that he has been here, he has made many friends, who wish him the best of success in his labors here.

THE RED POLLED BULL "DEMON" 5421.

C. S. PLUMB.

In 1904 Mr. J. McLain Smith of Dayton, Ohio, Secretary of the Red Polled Cattle Club of America, presented to the Ohio State University a herd of six Red Polled cows and heifers. These were a superior lot, one in fact being an imported cow. Recognizing the fact that the University should have in its herd only animals of superior merit, the writer wished to secure a Red Polled bull to use on this herd, that would thoroughly commend himself to the breeders as one of the right sort. Among American-bred bulls, none had so long been before the public as the bull "Demon" 5421, at the head of the celebrated herd of Andrew Bros. of Cedarville, Ohio. Not only had Demon a distinguished show ring career, but he had proven a great sire of show ring winners, while in the opinion of the writer, his females were superior in dual purpose development, though Andrew Bros. never made dairy tests of their herd. In the fall of 1904 Andrew Bros. were asked to price Demon to the Ohio State University, but this they had refused to do, informing the undersigned that they were planning to have a dispersion sale of their herd in the spring of 1905. They, however, had in the past refused $1000 for Demon, which is a high price for a bull of this breed.

On May 24th the herd of Andrew Bros. was sold at a dispersion sale at the Union Stock Yards Pavilion at Chicago, and "Demon" was then bid off by the Ohio State University for $175. This very low price was due to the few bull buyers at this sale, and to the fact that Demon is now approaching eight years of age, an age at which few bulls are wanted in the sale ring. However, plenty of illustrations occur in our live sotck annals of celebrated sires of both beef and dairy breeds being used in active service from 12 to 15 years. Demon was guaranteed as in perfect breeding condition and, being in excellent health, he should do good service in the Ohio State University herd for several years.

The show ring record of Demon is a really remarkable one, and it is doubtful if it could be equalled by but few males of any breed. He was dropped October 28, 1897, his breeder being J. W. Martin of Richland City, Wisconsin. He was sired by Elmer 3482, he by Bismarck 2189. His dam was Dorothy 3993, by the famous Falstaff 303. He began his show yard career in 1898 as a calf at the Wisconsin State Fair, where he was first, and at the Trans-Mississippi Exposition at Omaha, Neb., where he was also first in class. He was then purchased by Andrew Bros., and has been shown by them every year since without exception, up to and including 1904. As a yearling he was first prize in his class at the Wisconsin, Indiana and Illinois State Fair in 1899. In 1900 as a two-year-old he won first at the Ohio, Indiana and Illinois State Fairs, and also at the International Live Stock Exposition at Chicago. In 1901 he was first in the aged bull class at the Ohio and New York State Fairs, and won second place as aged bull at the Pan-American Exposition at Buffalo, and third place at the International Live Stock Exposition at Chicago. In 1902, Demon was shown only at the Ohio State Fair and at the International Live Stock Exposition, where in each case he won first prize as aged bull. In 1903 he was first prize aged bull and senior champion at the International Live Stock Exposition at Chicago. In 1904 Demon made his

final show by winning first at the Ohio State Fair, first in a ring of nine aged bulls at the Louisiana Purchase Exposition at St. Louis, and being made reserve champion, Prof. W. L. Carlyle, judge, while at the International Live Stock Exposition at Chicago, under the judgment of Blofield, an English judge for the occasion, he was placed second. Certainly this is a remarkable record, that a bull should have been fitted and shown for seven consecutive years, winning the highest honors almost to the final show, and keeping in active breeding condition all the time. His son, King Henry, was made Grand Champion over him at St. Louis while repeatedly his sons and daughters have now the highest of honors in the ring beside him. Now the State of Ohio will give him peace and plenty and comfort in his old age.

BEE KEEPING AS A BUSINESS.

F. H. SCHOLL,

Apiarist, Texas Agricultural and Mechanical College.

For the capital invested I know of no other agricultural industry that brings as good returns as does beekeeping. That is one reason why I have made apiculture my life business and my life study. I like the business, partly for the money there is in it, and also because it affords a large field for scientific investigation.

Texas is now the leading state in the Union in number of colonies of bees and their value, there being over 400,000 colonies, worth over $2,000,000, with the equipment for running them. These produce anually over 5,000,000 pounds of honey and a very large amount of wax. Yet beekeeping is still in its infancy. Fully 90 per cent of the great number of colonies are still in old box hives, just like our grand fathers used to keep bees, and this results in a much lower average yield of honey for the entire number which is twelve and one-half pounds per colony. If improved hives and methods were employed this average could be doubled or trebled, which would mean an enormous increase for the entire crop or annual output and greater profits for the beekeeper. It will also be well to remember that not 10 per cent of the honey that the honey flora yields is gathered and stored by the bees, therefore thousands upon thousands of pounds of nectar are going to waste annually for the want of bees to gather it. There are vast areas without bees, where the honey yielding flora is very abundant. This is especially so in southwest United States, which section of country is looked upon by the agricultural world as the "beekeepers' paradise of the world." In this section of country the majority of the brushy growths, shrubs, trees and plants, are honey-yielders. The acacia family is well represented. There is the guajilla, catsclaw, the mesquite tree, and many others that cover thousands upon thousands of acres of pasture land which will remain uncultivated for a long time yet and affords a fine field for the beekeeper.

In central Texas cotton is the main honey yielder, while horsemint, Monardia and many other plants yield much honey. In south and east Texas the rattan vine and basswood or linden, are very plentiful. The quality of the honey is very good and of light color, especially when produced in the proper manner, with up-to-date hives and appliances.

We have some beekeepers with from 2000 to 4000 colonies of bees, distrib-

uted in several apiaries over a wide range of territory. As it does not pay to keep too many in one place from 50 to 150 colonies are generally kept in a yard, about three miles apart. More would consume all the honey to be obtained in a locality and no surplus would be stored.

An average of about 100 pounds of honey can be figured on for any number of years. This will net the beekeeper about 7 or 8 cents per pound, so that his colonies, which cost him about five dollars to begin with, will more than pay for themselves in a single season. Some of my bees have made for me a return of 100 per cent for the money invested in them in a season.

Localities differ somewhat and also the season, so that one does not get rich quick at all times, but nevertheless beekeeping is a good paying business.

Some advocate specialization for beekeeping just as for other lines of business. There is more money in it when run on a large scale. Short methods can be used and the profits are greater. It is true of all lines of business. I presume the same holds good with fruit growing, live stock husbandry and all other agricultural industries.

GOVERNMENT AID FOR BEEKEEPERS.

The government has come to realize the importance of apiculture in the United States and an appropriation of $5000 was made by congress for this work. A new department of apiculture was created at Washington, with Mr. Frank Benton in charge as apicultural investigator, with two assistants and an apicultural clerk. A line of work has been planned and it is hoped that much good will result.

Of the states of the Union, Texas, I believe, is doing more for apiculture at present, than any other, for it has taken up the work at the State Agricultural and Mechanical College and the State Experiment Station.

As I have charge of the work here I will say a few words about what we are doing. I would very much like to see other states take up this kind of work, and it would be a good thing, I am sure, if such a department could be maintained at Ohio State University. We have at this college an apiary of forty colonies of bees, a commodious building for storing of appliances, part of which is divided off for a work shop and another for a honey room. Here are kept all necessary appliances and implements used in beekeeping and the students taking the course in apiculture have access to them so that they can learn their use. Experiments of many different kinds are carried on in the apiary, with the object of solving problems which the beekeeper himself can not solve.

Students receive instruction in apiculture during the spring term; and a special course in apiculture is also provided for.

Beekeeping offers a great field for scientific investigation and there are many questions continually coming up that can only be taken care of by experts and by experiment stations, which makes it very important that every state should make such provision for this kind of work, especially in those states where beekeeping is carried on extensively.

To show you how much can be done with beekeeping, I will tell you what has been done at the college. The apiary is surrounded by a tract of ten acres of land. Through the middle of it runs a beautiful wooded ravine, on which the apiary is located, making an ideal location for an apiary. Of the ten acres, four are cultivated and devoted to testing honey yielding plants, and other experimental purposes. Two plats of sev-

eral acres, one on each side of the ravine, have never been cultivated, but during this winter have been planted to fruit trees of different kinds, apples, pears, peaches, plums and japanese persimmons. The idea of this was to try the experiment of combining agriculture and horticulture, and I believe they will go very well together, for, if my orchard fails I may still make a crop of honey to depend on. Or even if I did not keep the bees for honey I should not be without them if I had an orchard, not even if I had only one or two trees. The bees are necessary to insure better fertilization of the blossoms, which results in a large crop of fruit and that better in quality and increased in size.

If the people would only grasp this idea, there would be a great increase in beekeeping in the next few years, without any great effort on the part of a single individual.

FITTING AND FEEDING CATTLE FOR SHOW.

LELAND E CALL.

In order to properly fit an animal for show it must be taken young. Most feeders prefer to take calves dropped in September or October. The selection of those to be fed (for show purposes) is made when the calves are from three weeks to a month old, for the ones nearest perfect at that time are the ones that feeders consider will make the best finished animals. In selecting the calf, breeding is not overlooked, for as the sire and dam are so in general will be their offspring. The calf must have a good head, showing feeding and capacity; must show quality in hair and bone, and above all must be well balanced, having a correct form, well-made frame, strong constitution and marked feeding characteristics.

Having made the selection that most nearly meets one's ideal the work of fitting will begin at once, and no inconsiderable amount of care and attention must be given. It is usually preferable to leave the calves in the pasture with the dams for several weeks, seeing that they receive sufficient milk and are growing thriftily. Before the weather becomes bad in the fall they should be taken to the barn; here they should have a roomy pen, with abundance of fresh air sunshine and bedding. Care should be taken that the floor of the pen is not damp, and many prefer a plank floor raised a foot or so from the ground.

The calves will now be from six to eight weeks old and should be started gradually on a grain ration as they learn to eat, letting them have at the same time plenty of whole milk from nurse cows. Their grain should consist of whole or cracked corn, whole oats and bran, about one-third of each. A rack of the choicest clover or alfalfa hay, clean and free from dust should be constantly before them. After every feed the troughs should be cleaned out, and every week they should be washed with scalding water. On the pleasant days it will be well to let the calves run in a dry, sheltered lot, where there is a tank of good pure water.

As spring comes on it is well to let the calves out for an hour or so on grass and as the season advances they may be turned out nights. It is likely that this will be a time of not much gain, but the grass cools off their system and prepares them for the heavy feeding which follows. If they are to be shown in the fall, there is a difference of opinion as to how long the animals should be al-

lowed to remain on pasture, but they should certainly be stabled before the middle of summer. At this time they should be given a box stall in a well ventilated, cool barn, the stables should be cleaned carefully, the manure not put in piles outside the barn to serve as a breeding place for flies, but be spread in the fields, and occasionally disinfectants should be used.

After taking from pasture a succulent food should be given; the grain ration should consist of ground oats, corn and bran with a little oil meal, and as show time approaches the corn should be gradually increased, although for a yearling care should be given not to feed too much corn. A variation of the foods to tempt the appetite is desirable, and in fact necessary, although violent changes should be guarded against. John Steward says that a few weeks before showing a feed a day of cooked wheat and barley will give luster to the coat and assist in giving a mellow touch and finish to the animal.

While in the stable sufficient exercise should be given and much of this may be obtained in educating the animal and teaching it to stand properly. As a rule it is not customary to blanket except a few weeks before the show, depending upon an occasional washing with the constant use of the brush as a means of keeping the animal clean. Just before the show a blanket has a tendency to keep the sun from bleaching the hair and gives it a gloss impossible otherwise to obtain.

After the first season's showing the yearlings are usually weaned and the grain feed is lightened, especially the corn. If possible they are given a few weeks on pasture before the winter comes on. The feed and corn for the next year is much the same except that more corn may be safely fed, and the supply of food necessarily increased with the growth of the animal.

RAMBLING THOUGHTS.

HARRY C. RAMSOWER.

Another year in the history of our College of Agriculture is fast drawing to a close and with its close a few thoughts come to us which it might not be amiss to express. A little time spent in reflection and comparison is time spent not in vain, for it is only thus oftimes that we become fully awakened to the advantages which are ours and only thus is satisfaction so greatly to be desired assured.

What has the year done for you, or, more properly speaking, what have you done for yourself during the year? For while there is a place for the saying, "Everything comes to him who waits," vastly richer in those "things" is he who soon tires of waiting and goes forth to capture the prizes first hand. Do you feel that the year has been profitably spent? Do you feel that *all* of your time has ben advantageously employed? Are you sure that you have done your level best? To begin and carry through a college course is a responsibility which is too often minimized. Four of the best years of a young man's life, to say nothing of the financial consideration, represents an investment which will be expected to yield no small interest in the future. Whether it does or not depends not a little on how our every movement is spent. We should congratulate ourselves that we are the pivileged attendants of a college which recognizes few superiors and in com-

mand of that college is a faculty every member of which is extremely solicitous for our welfare. But no matter how good the school, how earnest the instructors, but little good can come of our stay here unless we heartily coöperate with school and instructors in the work which is being done in our behalf.

Did you ever stop to think that it is for *us* that this college was founded? That it is for *us* that State funds are being expended? We should consider ourselves honored when we reflect that the State has confidence enough in the ability of her "horny handed sons of toil" to make better men of themselves when placed in proper environment to endow us with funds sufficient for carrying out our work. Figure for a moment the amount per student spent annually in our college and we dare say you will be surprised. Should not this fact then lead us to put forth our greatest and best efforts and prove to taxpayers and legislators that money spent in our behalf shall not be spent in vain?

Ofttimes we become dissatisfied with our conditions and long for more and better things; imagine what we might do were we at another college and under different environment. A young man once sat on a rock in his mother's dooryard dreaming of the wonderful things he might accomplish were he in that vast western country where numberless opportunities were only waiting for eager hands to seize them. He attempted to realize his dreams; wandered aimlessly about only to find that the opportunities of which he dreamed were still beyond his reach. Years afterward he returned and found that underneath his old home was a copper mine of exceeding great value, the first trace of which was found by an observing eye in the very rock on which he once sat. See to it that your present opportunities are improved before you begin to long for others. When you have proven yourself master of all things within your reach, then by all means look for larger ones. To be satisfied does not mean that we are to be content with living a mediocre life, but rather that we cheerfully accept our lot and view it as a necessary step to something higher.

The work of our college during the past year has been gratifying in every respect, and it is with keen anticipation that we should look forward to the opening of a new year and we should firmly resolve that no effort on our part will be spared to make it more profitable than any that have gone before.

Testing Alfalfa Seed for Impurities.

O. M. BALL.

The Experiment Station is constantly in receipt of letters from planters throughout the state containing inquiries concerning impurities in alfalfa and other seeds. The large number of such letters shows that the farmers are keenly alive to the consequences resulting from sowing seeds which are not pure. Some cases have been reported in which the whole crop of alfalfa had to be destroyed in order to get rid of a noxious weed which had made its appearance in the young field and which had never before been observed in that locality. We have recently had two letters from planters in the northern portion of the state, who have been obliged to resort to this method to exterminate a very dangerous weed, the Russian thistle.

The seeds of these pests are not intentionally placed in the alfalfa by the growers or handlers, but accidentally find their way into the seed since much of the alfalfa seed sold on these markets is from parts in which the foreign weeds

are prevalent. Many of these seeds are of about the same size and weight as those of alfalfa and hence are not screened out during the cleaning. So far as the work of this department has extended, we have not found that willful adulteration of alfalfa seed with other similar, but less valuable seeds, is anywhere practiced.

Many planters will not buy the highest grade of seeds, but prefer to sow a cheaper grade. It is of course advisable to buy economically, but such buying is not economical. The cheaper grades of seeds are almost always those which have a large proportion of impurities, or else are old seeds which have lost their vitality to a great extent. Hence such a buyer in the end pays a higher price for his seed than he who insists upon having the best grade.

FOREIGN WEEDS IN THE SEED.

We have recently received a sample of alfalfa seed which showed an average of 180 foreign seed to the ounce, of which 20 were of the Russian thistle. The amount usually sown to the acre is 20 pounds. At this rate, the farmer would find about 57,500 foreign weeds upon each acre which he sowed, supposing that most of these seeds germinated, of which 400 would be of Russian thistle. One need not be surprised that the whole crop had to be destroyed in order to get rid of these intruders. Of the weed seeds above mentioned, the greater part were of rib-grass, or plantain, which, in itself, is not a pest, but certainly would be in an alfalfa field.

EXAMINATION OF THE SAMPLE.

Every one contemplating the purchase of seeds should be able to examine the sample for himself. The methods of doing this are very simple. There are no secret processes in any scientific work, and the only advantages that the Experiment Station has over the ordinary observer are that our workers are trained and we are equipped to do the work at the least cost of time and money and with especial accuracy. To secure these, expensive apparatus is necessary, but simpler methods, carefully applied, can be used and the results are nearly always satisfactory.

METHODS.

Before purchasing the seed, secure a small sample, say one ounce. This should represent the seed fairly and should be obtained from several parts of the whole pile and should be thoroughly mixed. Spread about a tenth of the sample, after thoroughly mixing, out on a sheet of white paper, and with a caseknife, separate the alfalfa seeds from the suspicious foreign seeds. A count of the latter, multiplied by ten, will give the approximate number per ounce. The only source of error will be that deformed or immature alfalfa seed may be mistaken for weed seed, but proper care will eliminate this error. A small magnifying glass will materially aid the work, but it is not essential, if the eyes are reasonably sharp, except where the sample is suspected to contain seeds of dodder, which are very minute and thus likely to be overlooked. The work is very light and pleasant and, if young ladies are present in the household, they will find it interesting and attractive.

The amount of inert matter, (chaff, dirt, etc.) should be estimated in the same manner, since a high proportion of these means a direct loss of money.

University News.

Frank E. Pomerine, of Coshocton, was appointed by Governor Herrick as Trustee of Ohio State University to succeed Paul Jones. Mr. Jones' term expired on May 13. During Mr. Jones' term of office he was an efficient trustee.

His position in Columbus and throughout Ohio has enabled him to do a great deal for the advancement of the University. This coupled with his great interest in state educational work has meant a great deal to the University.

The Big Six Track Meet, the greatest event of the year in Ohio track athletics, was held at the Columbus Driving Park on Friday, May 26. Each team had been working hard, and from the records of the preceding meets of the year, contained sure point winners. There were fifteen events to be contested. Ohio State's team was looked upon as an uncertain quantity by the up-state men, both Oberlin and Reserve expecting to take the event with Ohio State a possible third. Ohio State supporters, on the quiet, said she would win. The result of the meet was that Ohio State took eight firsts out of the sixteen, taking points in every event but one, giving her a total of 61 points to Oberlin's 45, Reserve 36, Kenyon 13, O. W. U. 7, and Case 3.

The O. S. U. baseball team has been meeting with reverses, the number of games lost so far being such that Ohio State cannot win this year's state championship. Two games have been lost to Oberlin, two to Reserve, two to Denison, and one to Case.

The Junior Informal was held in the Gymnasium on Friday night, May 26. It was one of the most enjoyable occasions of the year.

The thirty-second annual inspection of the Ohio State Cadets took place on May 20. This inspection is required by the government and each year an inspecting officer is sent to the various colleges, where drill is a part of the curriculum. Captain Hardaway, formerly a student of the University, late of the Seventeenth Infantry, but now of the Columbus Barracks, conducted the inspection. The battalion is the largest and best drilled of any in the history of the University, the number drilling being about six hundred. Captain Hardaway congratulated the officers upon the excellent showing of their battalions.

In the annual prize drill, Company F, under Captain Hall, won the sword for the best drilled company, and Company A, under Captain Hugger, won the President's atendance sword.

The class of 1905 has selected a sun dial as its memorial. The dial will be placed in front of the Main Building along the cinder path leading to the spring.

INCUBATOR

Johnson started his new **Pay-for-itself** hatcher last year and raised a rumpus with high prices. Don't get fooled. Put your trust in

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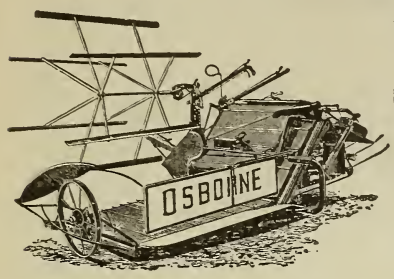

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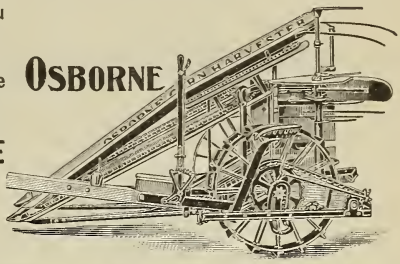

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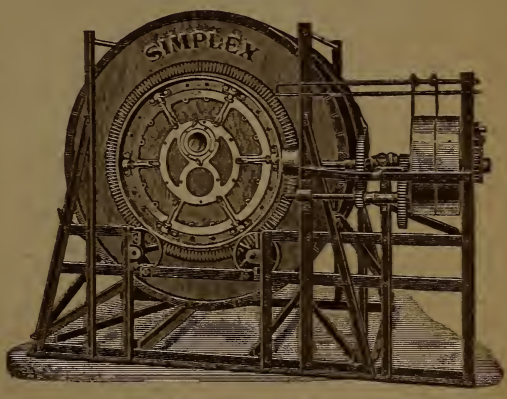

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